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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/980,496	12/04/2001	Masakatsu Urairi	Q66626	5637

7590 10/19/2004

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2100 Pennsylvania Avenue NW  
Washington, DC 20037

EXAMINER

YUAN, DAH WEI D

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 10/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/980,496	URAIRI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Dah-Wei D Yuan	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 August 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6 and 7 is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**BATTERY SEPARATOR CONTAINING CARBODIMIDE POLYMER**

Examiner: Yuan      S.N. 09/980,496      Art Unit: 1745      October 14, 2004

**Detailed Action**

1. The Applicant's amendment filed on August 10, 2004 was received. Claim 1 was amended.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on June 3, 2004.

***Claim Rejections - 35 USC § 103***

3. Claims 1,3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otani et al. (JP 2000-223106) in view of Amano et al. (US 5,416,149), and further in view of Nakamura et al. (EP 0805172 A2).

With respect to claim 1, Otani et al. teach a battery separator that is made of an ultrahigh molecular weight polyethylene porous sheet. See Abstract. However, Otani et al. do not teach the application of a polymer having carbodiimide groups on the porous sheet. Amano et al. teach the fabrication and use of a pulp-like material, which comprises polycarbodiimide as a coating. The material can be made into a sheet with excellent electrical insulation, heat resistance, flame resistance and mechanical properties. In particular, the material is suitable to be used as electrical insulating paper and battery separators. See Column 2 Lines 35-37; Column 2, Lines 55-58; Column 4, Lines 32-40. Therefore, it would have been obvious to one of ordinary skill in

the art to apply a polycarbodiimide on the battery separator of Otani et al., because Amano teach polycarbodiimide has excellent electrical, thermal and mechanical properties.

Moreover, Nakamura et al. teach a process to produce a polyfunctional polycarbodiimide compound containing at least four or more molecular chains bonded independently to a backbone. Each of the molecular chains contains a carbodiimide ( $-N=C=N-$ ) group. The polycarbodiimide compound can be obtained by reacting an isocyanate compound having one or more carbodiimide group and one or more isocyanate groups (side chain component) with the polyol, polyamine and/or aminoalcohol having four or more hydroxyl (backbone component), and, if necessary, further reacting the monohydric alcohol (terminal component). The molecular weight of the resulting polycarbodiimide compound is about 1,000 to 30,000. See Abstract; Column 3, Lines 7-21; Column 5, Lines 37-40. Nakamura et al. recognize that the molecular weight of the polycarbodiimide is a function of the side chain components, backbone component, and terminal component used in the process. Therefore, it would have been within the skill of the ordinary artisan to apply a polymer having the formula  $[-R-N=C=N-]_n-$  where n is an integer of 1-10,000 on the battery separator of Otani and Amano, because Nakamura et al. teach the molecular weight of the polycarbodiimide can be modified depending on the side chain component, backbone component and terminal component used in the reaction. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ215.

Otani et al., Amano et al. and Nakamura et al. do not specifically disclose the capacity retention value of the resulting separator. However, it is the position of the examiner that such

properties are inherent, given that both Otani et al., Amano et al. and Nakamura et al. and the present application produce similar battery separator. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999).

It is also the position of the examiner that the intended use "for an alkali secondary battery" in claim 1 does not add structure to the claim. Intended use of a known compound does not give it patentable weight. See *In re Thuau*, 57 USPQ 324, CCPA 979 135 F2d 344, 1943.

In addition, applicants cannot rely upon the foreign priority papers to overcome this rejection because a translation of said priority papers (JP 2000-103446, JP 2000-103450, JP 2000-103451) have not been made of record in accordance with 37 CFR 1.55. See MPEP §201.15.

With respect to claim 3, Otani et al. teach the battery separator is manufactured by sintering ultrahigh molecular weight polyethylene powder, and then cutting it in a sheet shape. See Abstract in Otani et al.

With respect to claim 4, the polycarbodiimide coating would inherently present in the pores of the separator substrate because the porous nature of the substrate. See Abstract in Otani et al.

With respect to claim 5, when the polycarbodiimide is applied as a coating on the separator substrate of Otani et al., at least part of the surface of the substrate would be coated with the material.

4. Claims 1,2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kung (US 5,389,471) in view of Amano et al. (US 5,416,149), and further in view of Nakamura et al. (EP 0805172 A2).

With respect to claim 1, Kung teaches a battery separator formed of microporous plastic sheet coated with a resin. The sheet is made of a non-woven fabric selected from the group consisting of polyolefin, polyamides and nylon fibers. See Column 2, Lines 40-42; Claim 6. However, Kung does not teach the application of a polymer having carbodiimide on the porous sheet. Amano et al. teach the fabrication and use of a pulp-like material, which comprises polycarbodiimide as a coating. The material can be made into a sheet with excellent electrical insulation, heat resistance, flame resistance and mechanical properties. In particular, the material is suitable to be used as electrical insulating paper and battery separators. See Column 2 Lines 35-37; Column 2, Lines 55-58; Column 4, Lines 32-40. Therefore, it would have been obvious to one of ordinary skill in the art to apply a polycarbodiimide on the battery separator of Kung et al., because Amano teach polycarbodiimide has excellent electrical, thermal and mechanical properties.

Moreover, Nakamura et al. teach a process to produce a polyfunctional polycarbodiimide compound containing at least four or more molecular chains bonded independently to a backbone. Each of the molecular chains contains a carbodiimide ( $-N=C=N-$ ) group. The polycarbodiimide compound can be obtained by reacting an isocyanate compound having one or more carbodiimide group and one or more isocyanate groups (side chain component) with the polyol, polyamine and/or aminoalcohol having four or more hydroxyl (backbone component),

and, if necessary, further reacting the monohydric alcohol (terminal component). The molecular weight of the resulting polycarbodiimide compound is about 1,000 to 30,000. See Abstract; Column 3, Lines 7-21; Column 5, Lines 37-40. Nakamura et al. recognize that the molecular weight of the polycarbodiimide is a function of the side chain components, backbone component, and terminal component used in the process. Therefore, it would have been within the skill of the ordinary artisan to apply a polymer having the formula  $[-R-N=C=N-]_n$  where n is an integer of 1-10,000 on the battery separator of Kung and Amano, because Nakamura et al. teach the molecular weight of the polycarbodiimide can be modified depending on the side chain component, backbone component and terminal component used in the reaction. *Discovery of optimum value of result effective variable in known process is ordinarily within skill of art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ215.

Kung, Amano et al. and Nakamura et al. do not specifically disclose the capacity retention value of the resulting separator. However, it is the position of the examiner that such properties are inherent, given that both Kung, Amano et al. and Nakamura et al. and the present application produce similar battery separator. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference.* In re Robertson, 49 USPQ2d 1949 (1999).

It is also the position of the examiner that the intended use "for an alkali secondary battery" in claim 1 does not add structure to the claim. Intended use of a known compound does not give it patentable weight. See *In re Thuau*, 57 USPQ 324, CCPA 979 135 F2d 344, 1943.

With respect to claim 2, Kung teaches the separator substrate is a non-woven fabric comprising polyolefin fibers. See Claim 6.

***Allowable Subject Matter***

5. Claims 6,7 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The invention of independent claim 6 recites a battery separator obtained by applying a polymer having in the molecule a carbodiimide unit having a formula of  $[-R-N=C=N-]_n-$  to a porous sheet substrate, which comprises a porous sheet substrate produced by aggregating polycarbodiimide-coated polymer on the surface of core particles. The closest prior art of record does not disclose or suggest that the separator substrate is produced by aggregating polycarbodiimide-coated polymer particles obtained by forming a coating layer of the polymer on the surface of core particles.

***Response to Arguments***

6. Applicant's arguments filed on August 10, 2004 have been fully considered but they are not persuasive.

*Applicant's principle arguments are*

*The amended claim 1 recites an element which attributes to unexpectedly superior results in capacity retention of the battery separator.*



In response to Applicant's arguments, please consider the following comments.

The unexpectedly superior results of the instant disclosure need to be made in comparison with the separator cited in the prior art. Applicants are encouraged to provide additional information/evidence to support the assertions.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan  
October 14, 2004

A handwritten signature in black ink, appearing to read 'D. Yuan', with a long horizontal flourish extending to the right.